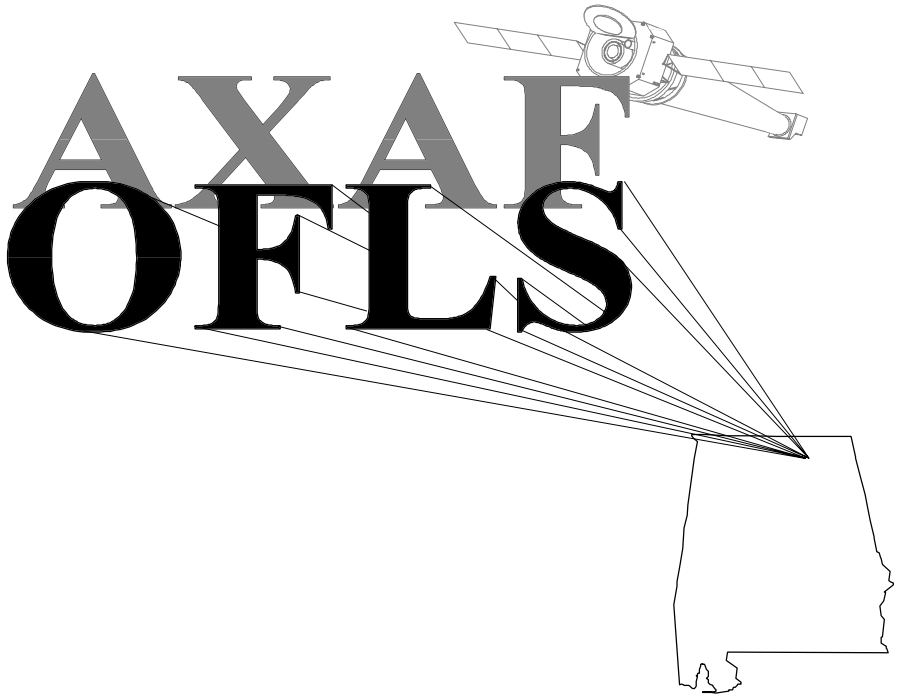

OFLS MPS Release Capabilities

M. Newhouse

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February 26, 1997

Release 3A Capabilities (1 of 4)

OR/ER Processing

- **create and review comments**
- **modify OR/ER parameters**
- **process orbit relative times**

Schedule Generation

- **allow request segmentation**
- **calculate maneuvers for multiple targets and solar system objects**
- **support phase parameter**
- **use guide star visibility windows**
- **use predicted power usage**
- **generate scheduled OR/ER data file**

Release 3A Capabilities (2 of 4)

Maneuver processing: segment large angle maneuvers

SI support: calculate SIM position and SIM move duration

Guide star selection

- **select valid guide and acquisition stars based on**
  - **OR/ER specified stars**
  - **magnitude**
  - **quality code**
  - **nearest neighbor**
  - **roll dependent checks: star column spoilers, FOV, bad pixel regions**
- **select 5 best stars based on FOM without roll dependencies**

Release 3A Capabilities (3 of 4)

SSR support

- **calculate SSR usage**
- **schedule SSR playbacks based on SSR usage**

Graphical Schedule Timeline

- **display scheduled ORs, ERs, and support activities (maneuvers and acquisitions)**
- **modify scheduled times by dragging and dropping (display only)**

Release 3A Capabilities (4 of 4)

DOT translation

- **output MAN (maneuver) statement parameters**
- **output ACQ (acquisition) statement parameters**
- **output SIM (SIM position) statement parameters**
- **output ACISOBS and HRCOBS statement parameters**
- **output OTG (grating) statement parameters**
- **output DTHR (dither) statement parameters for OR/ER specified dither parameters**

Release 3B Capabilities (1 of 6)

OR/ER Processing

- **match baseline OP-19 specifications**
- **add new guide and acquisition star parameters**
- **generate edited OR/ER lists**

Schedule Generation

- **support continuity across schedule boundaries**
- **select guide and acquisition stars based on scheduled roll**
- **restrict maneuver size based on guide and acquisition star availability**
- **use altitude constraints**
- **use precedence constraints**

Release 3B Capabilities (2 of 6)

Schedule Generation (continued)

- **support automated schedule conflict resolution**
- **use predicted OBC memory usage**

Maneuver processing

- **calculate momentum dump duration**
- **display multiple maneuver segment parameters**
- **support ESA targeting**
- **support spacecraft reference frame maneuver**

SI support

- **schedule ACIS bias activities**
- **override default radiation limits**

Release 3B Capabilities (3 of 6)

Generate LGA profile display

Generate resource (OBC and power) profile displays

SSR support

- **schedule SSR playbacks based on**
  - **DSN availability**
  - **LGA visibility**
  - **communications conflicts**
- **generate SSR profile plot**

Release 3B Capabilities (4 of 6)

Guide star selection

- **select valid guide and acquisition stars based on**
  - **OR/ER-specification of separate guide/acquisition stars**
  - **roll dependent checks: planet spoilers, readout register**
- **select FID lights based on**
  - **OR/ER specified FID lights**
  - **magnitude**
  - **bad pixel regions**
  - **roll dependent checks: nearest neighbor, column star spoilers, planet spoilers, readout register**
- **generate AC FOV and star field**

Release 3B Capabilities (5 of 6)

Communications support

- **schedule communications contacts based on DSN availability, LGA visibility, and communications conflicts**
- **request additional communications support**

Graphical Schedule Timeline

- **display supporting information: ACIS bias, orbit events, and visibility**
- **modify schedule by dragging and dropping, explicit time reference, and biasing**
- **add, delete, and modify ORs and ERs**
- **check all schedule constraints based on user edits**
- **generate and review schedule and OR/ER comments**
- **generate profile plots**

Release 3B Capabilities (6 of 6)

DOT generation

- **output COMSET (communications) statement parameters**
- **output SYSMOM (momentum dump) statement parameters**
- **update ACISOBS processing to support ACIS bias**
- **update DTHR processing to support default dither parameters and no dither**
- **modify SIM processing to support packet processing**
- **check all DOT constraints**

Graphical DOT Timeline

- **display DOT activities**
- **add, delete, modify, move DOT activities**
- **generate and review DOT comments**

Release 4 Capabilities

Momentum and reaction wheel speed profile plots

New Requirements

Target name string format

SIM Hysteresis

Multiple SSR playback rates

X-ray constraint object IDs in Scheduled OR/ER Data

Generate schedule comparison report

New commands

- **support edit star catalog command**
- **support maneuver parameter command**
- **support FID light control command**
- **support ACA integration time command**

ASC Mission Planning Release Capabilities

Release 2: Supports primary thread for Science Plan generation, star selection, OR generation and submission, and Mission Schedule evaluation.

Application	Executable Name
Star/Fidlight Evaluator Application	mp_sfe
Star/Fidlight Evaluator GUI	mp_sfe_gui
Mission Planning Cat Application & GUI	mp_mpcat_gui
MPCAT Extract Function	mp_mpcat_extract
MPCAT Convert Function	mp_mpcat_convert
MPCAT Import Function	mp_mpcat_import
Spike Application	mp_spike
Accept Science Plan Application & GUI	mp_asp_gui
Observation Request Formatter App & GUI	mp_orf_gui
Mission Schedule Comparator Application	mp_msc
MSC Mission Schedule Summary Function	mp_msc_mss
MSC Obs Pointing Profile Function	mp_msc_opp
MSC Schedule Exceptions Profile Fnctn	mp_msc_sep
MSC GUI and Timeline Function	mp_msc_gui

Capabilities:

Star/Fidlight Evaluator

- select guide stars, acquisition stars, fidlights
- display SFE parameter files
- report figure of merit; save output file
- view output file, SFE logfile

MPCAT Extraction

- extract targets from OCAT for use in creating Science Plan
- allow extraction based upon observation status, priority, duration, location, existence of constraints, or SI
- sort list by RA/Dec, SI, remaining time, constraints, etc.
- view constraints, dither, SFE file
- launch SFE
- import/save MPCAT file
- convert MPCAT entries into Spike input format

Generate Long Term Science Plan

- Spike Application

→ configure user path environments

→ launch Spike

→ generate long-term science plan

→ print reports; save science plan

- Accept Science Plan

→ view Spike science plan

→ view MPCAT

→ view Spike schedule file

→ accept plan as official

OR Formatter

- extract targets from selected interval in Science Plan
- extract targets from OCAT
- view SFE data, target comments, constraint values
- save OR list
- transmit OR list

Mission Schedule Comparator

- select Scheduled OR/ER data file

- sort entries based upon position, priority, SI, etc.
- display schedule details for each target
- display timeline
- generate Mission Schedule summary file, pointing profile file, schedule exceptions file

Status:

Development incrementally completed except for code that continues to evolve as a result of interface dependencies:

- Star Catalog
  - → corrections to some catalog entries
  - → ingest catalog into Sybase
  - → anticipate April closure time
- OCAT
  - → OCAT database does not exist; database efforts currently concentrated on XRCF support
  - → OCAT currently "stubbed" with external file
  - → anticipate May closure time
- Spike
  - → modifications to support several functions still outstanding (*e.g.* orbit update, roll constraints, interface for parameter updates, display and file handling enhancements)
  - → anticipate April closure time

Release 4A (10/01/97): Post-XRCF and OCC Setup

- ACIS parameter block generation software

  → incorporate and place under configuration management

- Implement interfaces to ODB from all MP applications.

  → OR transmission

  → Scheduled OR/ER Data receipt

  → ODB Population (*e.g.* ACIS parameter blocks, ACA mode info., etc.)
  Question: How are comments to Scheduled OR/ER Data handled?

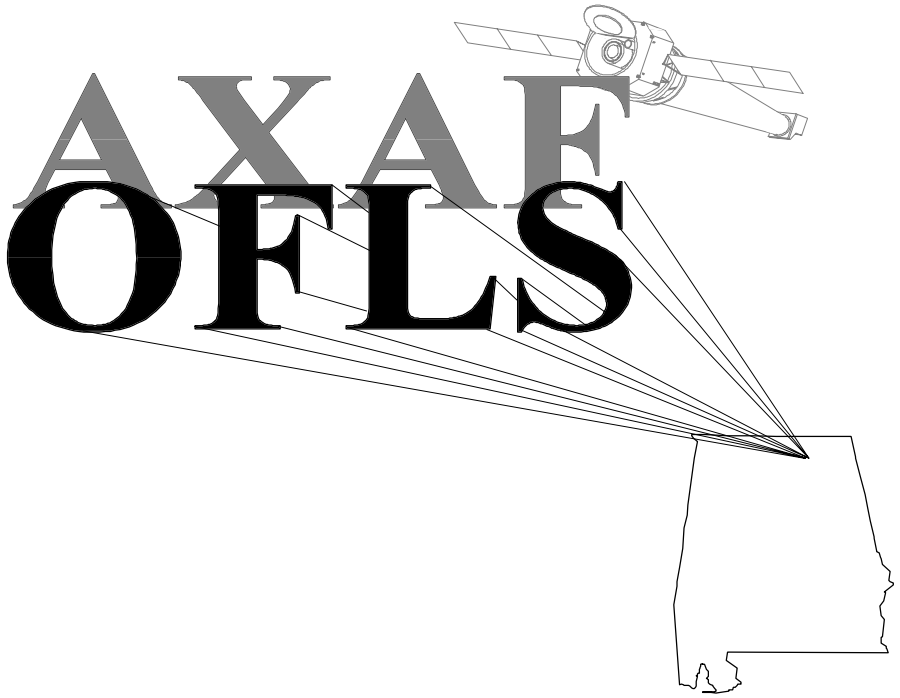
  → Other displays from ODB (*e.g.* default parameters for avoidance angles, dither, etc.)
  Note: Currently can't do this because we cannot access ODB directly from ASC Mission Planning computers!

- SSA interface support to include Sybase version of AGASC and AOSS

- Mission Planning Accounting Tools

  → for calculating broad AXAF usage statistics (e.g. percent GTO/GO time, etc.)

  → requires fully populated OCAT in Sybase



Guide Star Selection Updates

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February 26, 1997

ACQ Statement Parameters (1 of 2)

Bright magnitude limit (AQMMINn) - star magnitude minus star magnitude error; used onboard to discriminate against false images

Faint magnitude limit (AQMMAXn) - star magnitude plus star magnitude error; used onboard to set the image threshold

Search region dimension (AQBOXn) - largest box that does not contain a spoiler star, FID light, or planet

High resolution flag (AQRESn) - database input

Image size (AQSIZEn) - database input

ACQ Statement Parameters (2 of 2)

Image type flag (AQFLGn) - OR/ER specified stars that fail any checks are designated as monitor windows

Convert to track flag (AQMONn) - database input with values

- **convert to track**
- **monitor only**
- **track alternate star**

Designated tracked star (AQDTSn) - if tracking alternate star, set to brightest star with guide quality code = 0 or best first guide quality code (ASPQ1)

FID Light Selection

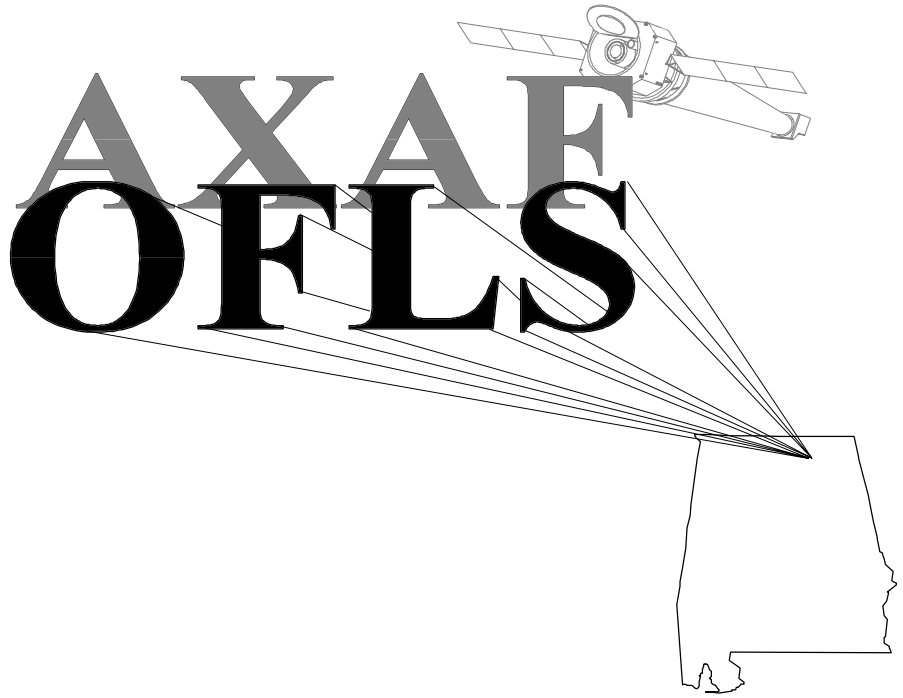
Optimal FID light set for each SI (ACIS-I, ACIS-S, HRC-I, HRC-S) is specified in the database

- **if insufficient guide stars can be found using the optimal set, alternate sets are selected in priority order from the database list**
- **if insufficient guide stars can be found using any allowed FID light set, the magnitudes of the FID lights are adjusted (in order of FID light set priority)**
- **if insufficient guide star can be found using any allowed FID light set at any allowed magnitude, the observation will not be scheduled**
- **if sufficient guide stars are found but insufficient acquisition star can be found, the FID light(s) will be turned off for the duration of the acquisition of the acquisition stars**

Slew Accuracy

For potential acquisition stars

- **determine maximum size of search box**
- **check that search box is greater than minimum search box size plus the minimum slew error from database lookup table**
- **from the search box size and minimum search box size determine the maximum allowed slew error**
- **use database lookup table to define maximum allowed slew angle for the maximum allowed slew error**
- **eliminate any stars with a group quality code greater than or equal to the lower limit from database lookup table**
- **schedule observation only if slew angle is less than or equal to the maximum allowed slew angle**



SIM Hysteresis

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February 26, 1997

SIM Hysteresis (1 of 2)

Memorandum from D. Cheshire dated 2/4/97, Response to Action Item SIM Delta-CDA-038 summarizes analysis concerning the problem and possible resolutions

Actual focus position can vary from commanded position due to two effects

- **snapover on each of the foot assemblies (~0.0002 to ~0.0012)**
- **friction and clearances in the foot assembly pivot bushings (~0.0006 inches)**

On orbit focus calibration is time consuming and not sufficiently accurate (~0.0010 inches)

Suggested solution is to impose an operational constraint to always approach a focus position from the same direction

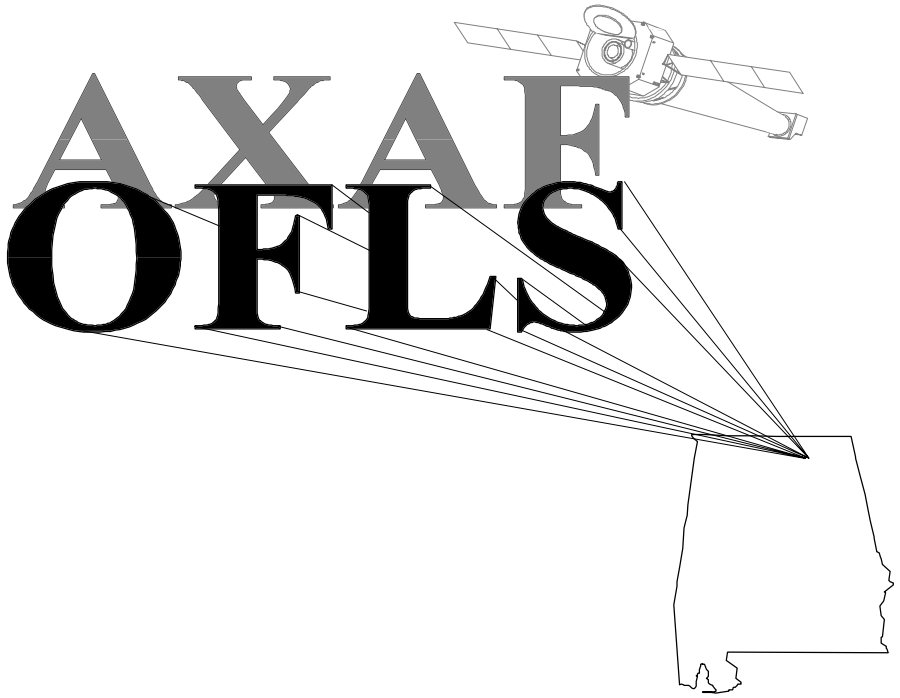
SIM Hysteresis (2 of 2)

MPS Support

- **-x focus location; Tab 1: when moving in the direction of decreasing x, always issue 2 reposition commands**
  - **first to a database-specified distance beyond the required focus location**
  - **second to the required focus location**
- **+x focus location; Tab 3: no change**

Issues

- **is there a minimum distance traveled over which no special action must be taken?**
- **is there a lifetime limit concern that requires MPS tracking and warning about too many motions**



New Command Scenarios

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February 26, 1997

Edit Star Catalog (1 of 2)

Scenario: subsequent spacecraft activity uses some, but not all of the same acquisition and/or guide stars as the preceding activity

MPS support

- **modify DOT processing to maintain star history**
- **add a new activity description to reference the edit star catalog command**
- **add logic to the DOT to**
  - **issue the current ACQ statement if all the stars are different**
  - **issue the new statement if any stars are the same**

Option: add a flag to existing ACQ statement and put all logic in the command sequence definition

Edit Star Catalog (2 of 2)

Issues

- **should we issue any statement if no stars are different?**
- **how do we indicate no stars are to be acquired?**

Maneuver Parameters Command (1 of 2)

Scenarios

- **tracking a moving target**
- **scanning across an extended field**

MPS support

- **add OBS/CAL parameters to specify the maneuver duration**
- **add processing to check the specified maneuver rate**
- **add DOT processing to output maneuver parameters on the MAN statement**

Options

- **specify maneuver rate rather than duration on the OBS/CAL statement**
- **separate activity description for maneuver parameters**

Maneuver Parameters Command (2 of 2)

Issue: do we need a separate maneuver duration (or rate) for each target, maneuver, and ss_object parameter?

FID Light Control Command (1 of 2)

Scenario

- **when reconfiguring FID lights, must specify demux, demux channel, and intensity for changing FID lights prior to initiating ACA search sequence**

MPS support

- **provide FID light number and SI on ACQ and edit star catalog activity description**
- **use to set correct demux and demux channel in command sequence definition file**

Options

- **database lookup table for which demux and demux channel for each FID light**
- **specify demux and demux channel on the ACQ and edit star catalog activity descriptions**

FID Light Control Command (2 of 2)

Issue: is there any reason to change the demux and demux channel assignment for the ACIS fid lights except for hardware failure?

ACA Integration Time Command (1 of 2)

Scenario

- **ACA calculates and uses a default integration time at the start of a search operation (EQ7-278E, 3.2.1.10.1.2.5)**
- **ACA uses ground updated value if appended within a command group to the end of a search command sequence (EQ7-278E, 3.2.1.10.1.2.6)**
- **ACA uses the latest integration time from any function when converting to track (EQ7-278E, 3.2.1.10.3)**
- **flight software only transmits any ground commanded value (FSW DM05, 3.2.3.3.3.5.20)**
- **integration time must be commanded whenever the ACA default value should not be used**

ACA Integration Time Command (2 of 2)

MPS options

- **if ACA default is nominally used, issue ACA integration time based on the ACA_MODE parameter**
- **if ACA default is nominally overridden**
  - **add a lookup table to the characteristics specifying integration time for ranges of dimmest star threshold value**
  - **override database lookup value based on the ACA_MODE parameter**

Issue: do we need maximum differences in star thresholds for guide stars and acquisition stars (EQ7-278E, 3.2.1.3)?

OFLS rev2.1 notes

How to get to the OFLS server and software:

You will need to open the Command Line Interface window from the Management menu on the Launchpad. Open the workstation to all clients by typing the command:

xhost +

Then Telnet to the OFLS server. You will need to know the name or IP of the OFLS server and your username and password. You will need to change directories to the OFLS software:

cd //ehs/ofls/rev2_1/bin

You should see these directories:

adsc cm iss mps ssea system user

Where to put/find:

OR/ER files - go in the **ehs/ofls/rev2_1/bin/mps/init** directory with **.or** / **.er** extension

Activity Descriptions - go in the **ehs/ofls/rev2_1/bin/mps/init** directory with **.sce** extension

Command Sequence Definitions - go in the **ehs/ofls/rev2_1/bin/cm/init** directory with **.ats** / **.rts** extension

Characteristics and Constraints - go in the **ehs/ofls/rev2_1/bin/system** directory with **.uut** extension

Recommendation for file management:

I recommend each person/team have a set of directories for their file output to eliminate any confusion between files and prevent accidental deletion.

For ISS there are four locations for file output:

ehs/ofls/rev2_1/bin/iss/ephemeris/definitive/[user directory]
ehs/ofls/rev2_1/bin/iss/ephemeris/predictive/[user directory]
ehs/ofls/rev2_1/bin/iss/orbitevents/definitive/[user directory]
ehs/ofls/rev2_1/bin/iss/orbitevents/predictive/[user directory]

For MPS there is only one location for file output:

ehs/ofls/rev2_1/bin/mps/output/[user directory]

ISS (ephemeris generation):

Remove/rename any files with the **.int** extension from the **ehs/ofls/rev2_1/bin/iss/init** directory

Change paths and names of ephemeris and orbitevents files on first page

Change paths and names of history files and init files under the data menu (ephemeris and/or orbitevents files)

Check your parameters and select user supplied state vector as needed

MPS (schedule generation):

Change the input file paths to point to the appropriate files.

Change location of the MPS output directory (and CM output directory if necessary)